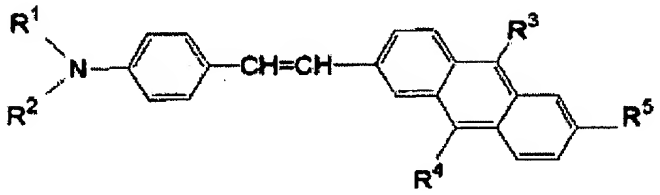
Claims

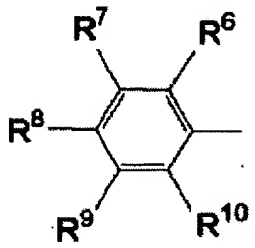
1. An aminostyrylanthracene compound represented by the following general formula [I], [II], [III], or [IV].

General formula [I]



[where, in the general formula [I] above, R^2 represents an unsubstituted aryl group, R^1 represents an aryl group represented by the following general formula (1),

General formula (1)

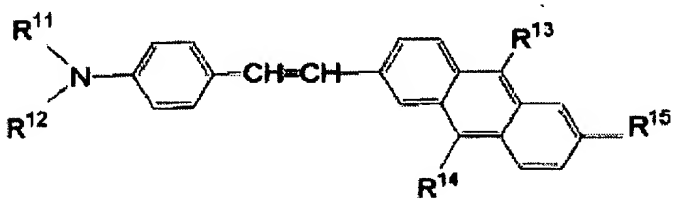


(where, in the general formula (1) above, R^6, R^7, R^8, R^9, and R^{10} are identical or different groups, each representing a hydrogen atom, a saturated or unsaturated hydrocarbon oxy group having one or more carbons, a hydrocarbon group, a hydrocarbon amino group, a fluoroalkyl group, or an aryl group which may have a substituent),

R^3 and R^4 are identical or different groups, at least one of them being a hydrogen

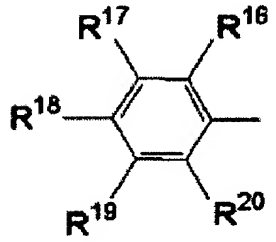
atom, a cyano group, a fluoroalkyl group, a nitro group, or a halogen atom, and R^5 represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent]

General formula [II]



[where, in the general formula [II] above, R^{11} and R^{12} are identical or different groups, each representing an aryl group represented by the following general formula (2),

General formula (2)

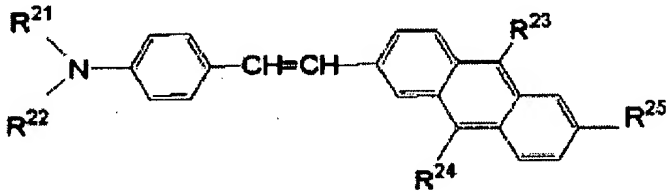


(where, in the general formula (2) above, R^{16}, R^{17}, R^{18}, R^{19}, and R^{20} are identical or different groups, each representing a hydrogen atom, a saturated or unsaturated hydrocarbon oxy group having one or more carbons, a hydrocarbon group, a hydrocarbon amino group, a fluoroalkyl group, or an aryl group which may have a substituent),

R^{13} and R^{14} are identical or different groups, at least one of them being a hydrogen

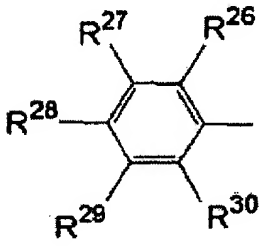
atom, a cyano group, a fluoroalkyl group, a nitro group, or a halogen atom, and R^{15} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent.]

General formula [III]



[where, in the general formula [III] above, R^{21} represents an aryl group represented by the following general formula (3),

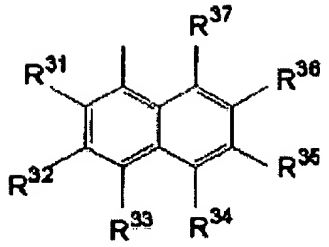
General formula (3)



(where, in the general formula (3) above, R^{26}, R^{27}, R^{28}, R^{29}, and R^{30} are identical or different groups, each representing a hydrogen atom, a saturated or unsaturated hydrocarbon oxy group having one or more carbons, a hydrocarbon group, a hydrocarbon amino group, or a fluoroalkyl group),

R^{22} represents an aryl group represented by the following general formula (4),

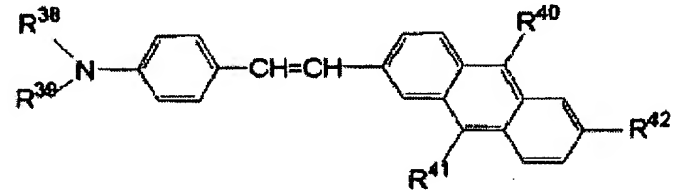
General formula (4)



(where, in the general formula (4) above, R^{31}, R^{32}, R^{33}, R^{34}, R^{35}, R^{36}, and R^{37} are identical or different groups, each representing a hydrogen atom, a saturated or unsaturated hydrocarbon oxy group having one or more carbons, a hydrocarbon group, a hydrocarbon amino group, a fluoroalkyl group, or an aryl group which may have a substituent),

R^{23} and R^{24} are identical or different groups, at least one of them being a hydrogen atom, a cyano group, a fluoroalkyl group, a nitro group, or a halogen atom, and R^{25} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent]

General formula [IV]

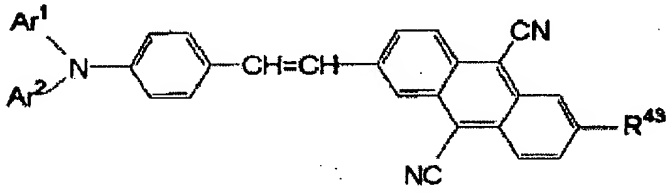


[where, in the general formula [IV] above, R^{38} and R^{39} are identical or different groups, at least one of them being a hydrogen atom or a saturated or unsaturated hydrocarbon group having one or more carbons, R^{40} and R^{41} are identical or different groups, each representing a hydrogen atom, a cyano group, a fluoroalkyl

group, a nitro group, or a halogen atom, and R^{42} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent.]

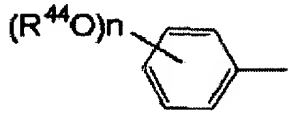
2. An aminostyrylanthracene compound as defined in Claim 1, which is represented by the following general formula (5).

General formula (5)



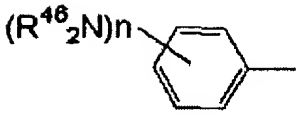
[where, in the general formula (5) above, Ar^1 and Ar^2 are identical or different aryl groups which may have a substituent and, if they have a substituent, they represent a group selected from aryl groups represented by the following general formulas (6), (7), (8), (9), (10), and (11),

General formula (6)

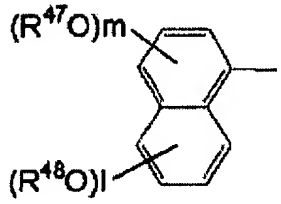


General formula (7)

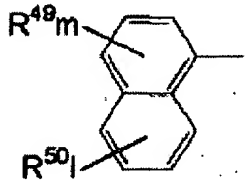
General formula (8)



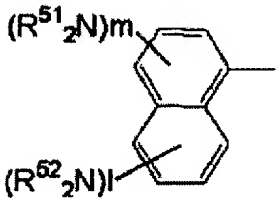
General formula (9)



General formula (10)



General formula (11)



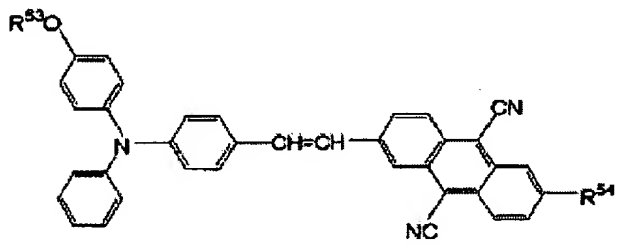
(where, in the general formulas (6), (7), (8), (9), (10), and (11) above, R^{44}, R^{45}, and R^{46} each represent a saturated or unsaturated hydrocarbon group having one or more carbons, or a fluoroalkyl group, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} are identical or different groups, each representing a saturated or unsaturated hydrocarbon group having one or more carbons, or a fluoroalkyl group, n is an integer of 0 to 5, m is an integer of 0 to 3, and l is an integer of 0 to 3),

R^{43} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent.]

3. An aminostyrylanthracene compound as defined in Claim 2, wherein R^{44}, R^{45}, R^{46}, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} each represent a group having 1 to 6 carbons.

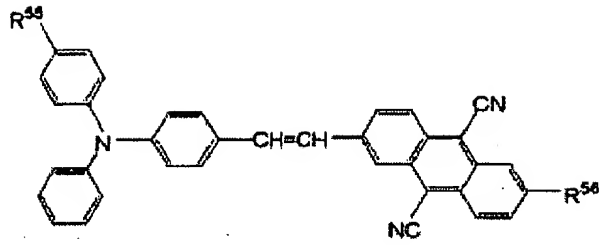
4. An aminostyrylanthracene compound as defined in Claim 2, which is represented by the following general formula (12), (13), (14), (15), (16), (17), or (18).

General formula (12)



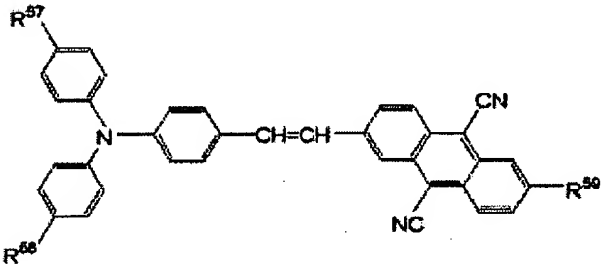
(where, in the general formula (12) above, R^{53} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{54} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (13)



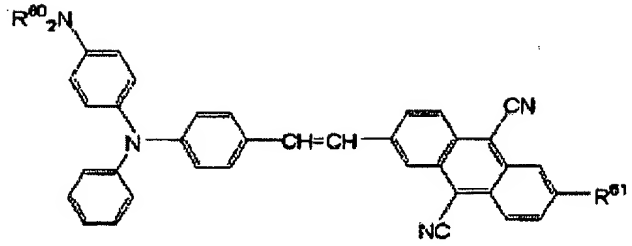
(where, in the general formula (13) above, R^{55} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or an aryl group which may have a substituent, and R^{56} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent)

General formula (14)



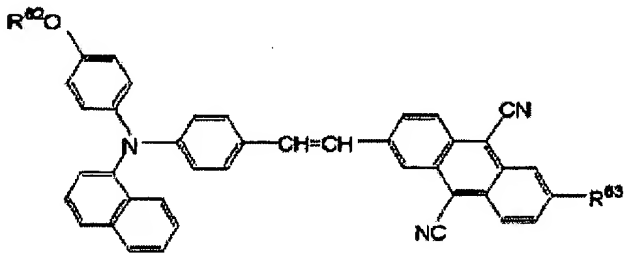
(where, in the general formula (14) above, R^{57} and R^{58} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or an aryl group which may have a substituent, and R^{59} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent)

General formula (15)



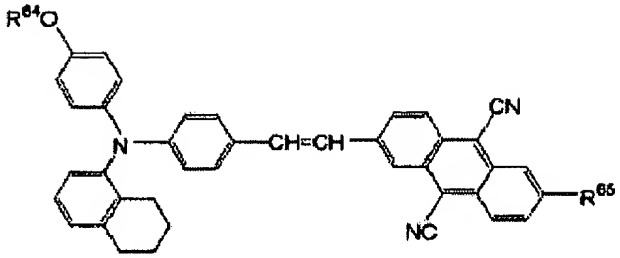
(where, in the general formula (15) above, R^{60} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{61} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (16)



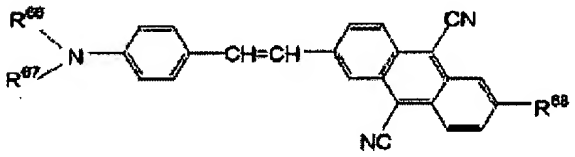
(where, in the general formula (16) above, R^{62} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{63} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (17)



(where, in the general formula (17) above, R^{64} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{65} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (18)

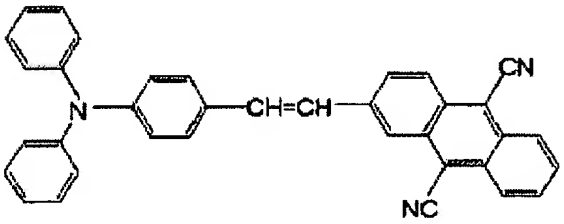


(where, in the general formula (18) above, R^{66} and R^{67} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{68} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.).

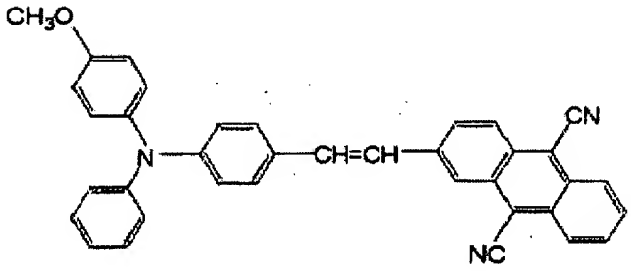
5. An aminostyrylanthracene compound as defined in Claim 2, which is represented by the following structural formula (19)-1, (19)-2, (19)-3, (19)-4, (19)-

5, (19)-6, (19)-7, (19)-8, (19)-9, (19)-10, (19)-11, or (19)-12.

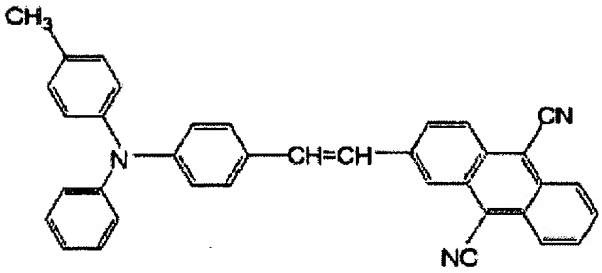
Structural formula (19)-1



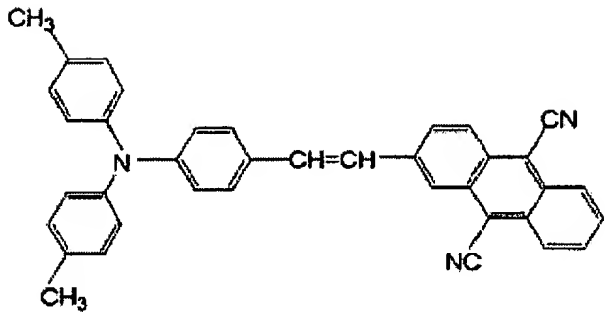
Structural formula (19)-2



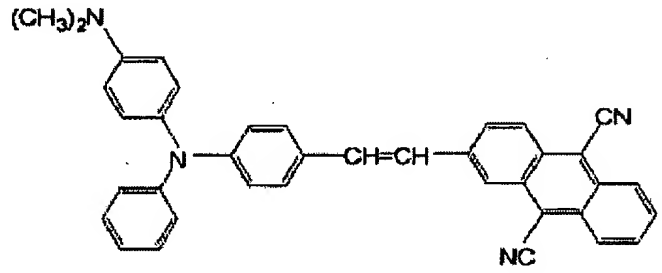
Structural formula (19)-3



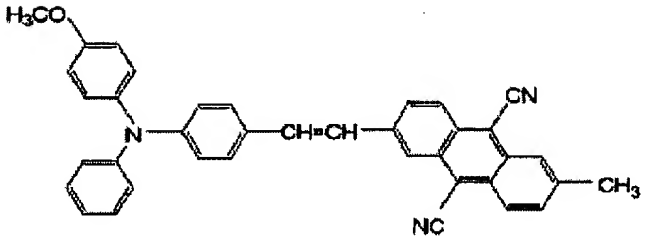
Structural formula (19)-4



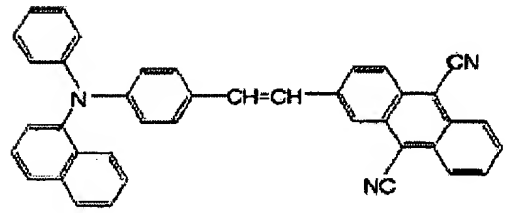
Structural formula (19)-5



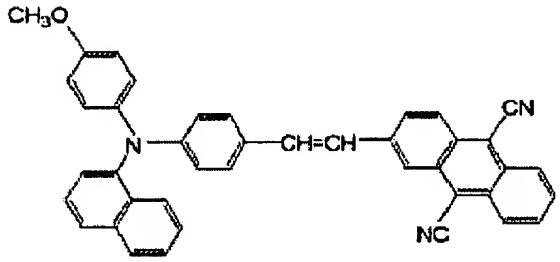
Structural formula (19)-6



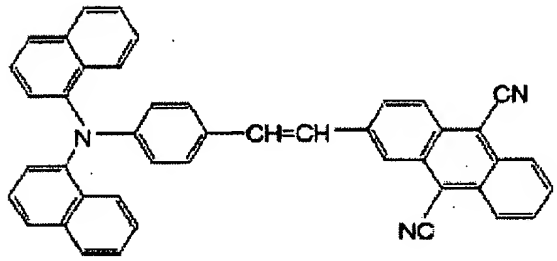
Structural formula (19)-7



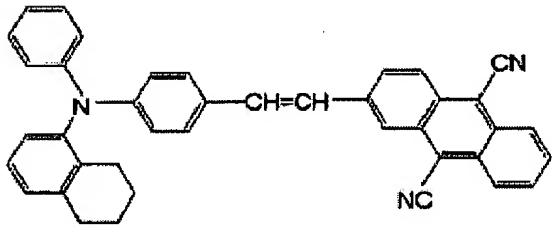
Structural formula (19)-8



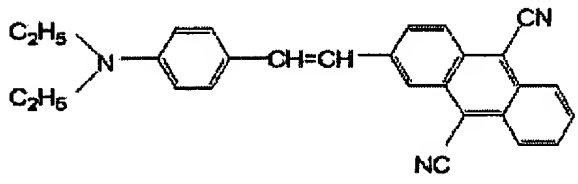
Structural formula (19)-9



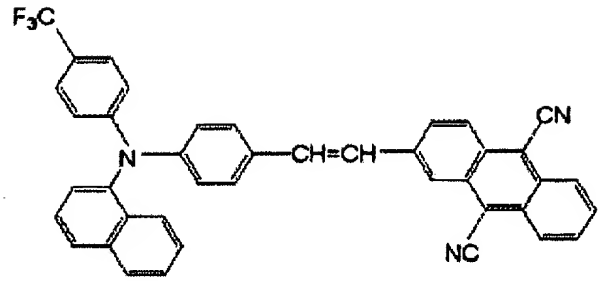
Structural formula (19)-10



Structural formula (19)-11

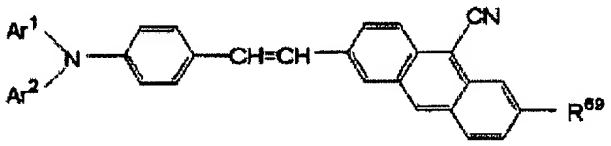


Structural formula (19)-12



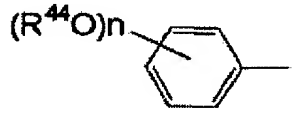
6. An aminostyrylanthracene compound as defined in Claim 1, which is represented by the following general formula (20).

General formula (20)

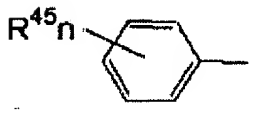


[where, in the general formula (20) above, Ar^1 and Ar^2 are identical or different aryl groups which may have a substituent and, if they have a substituent, they represent a group selected from aryl groups represented by the following general formulas (6), (7), (8), (9), (10), and (11),

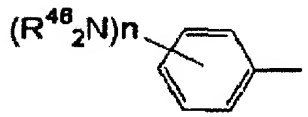
General formula (6)



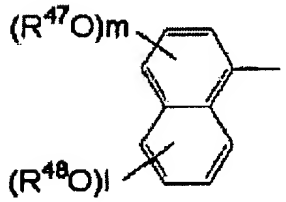
General formula (7)



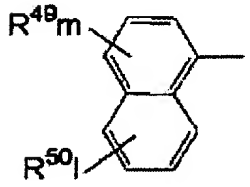
General formula (8)



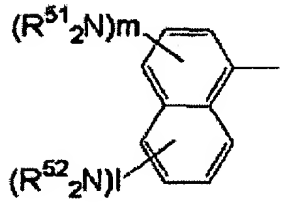
General formula (9)



General formula (10)



General formula (11)



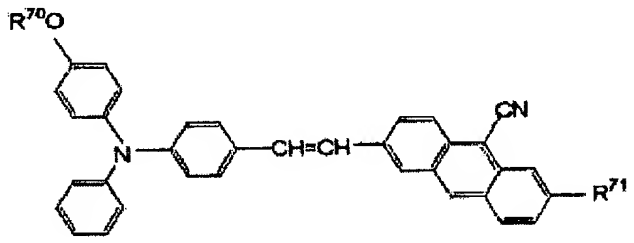
(where, in the general formulas (6), (7), (8), (9), (10), and (11) above, R^{44}, R^{45}, and R^{46} each represent a saturated or unsaturated hydrocarbon group having one or more carbons or a fluoroalkyl group, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} are identical or different groups, each representing a saturated or unsaturated hydrocarbon group having one or more carbons, or a fluoroalkyl group, n is an integer of 0 to 5, m is

an integer of 0 to 3, and l is an integer of 0 to 3), and R^{69} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group or an aryl group which may have a substituent.]

7. An aminostyrylanthracene compound as defined in Claim 6, in which R^{44}, R^{45}, R^{46}, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} each represent a group having 1 to 6 carbons.

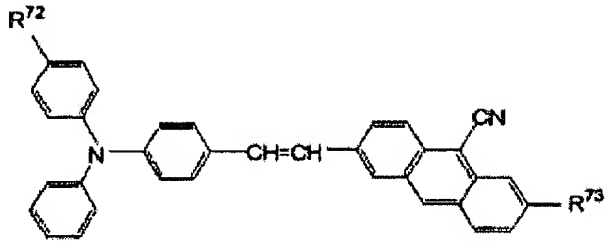
8. An aminostyrylanthracene compound as defined in Claim 6, which is represented by the following general formula (21), (22), (23), (24), (25), (26), or (27).

General formula (21)



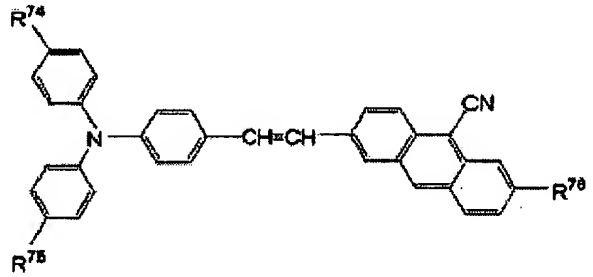
(where, in the general formula (21) above, R^{70} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{71} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (22)



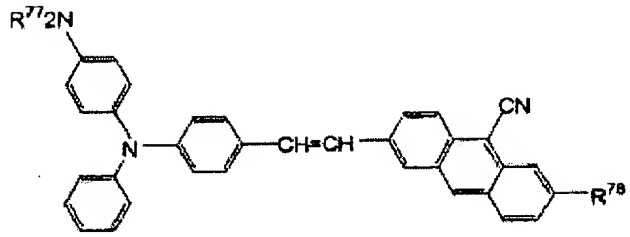
(where, in the general formula (22) above, R^{72} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or an aryl group which may have a substituent, and R^{73} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (23)



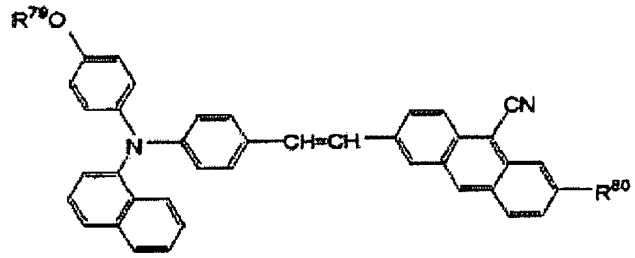
(where, in the general formula (23) above, R^{74} and R^{75} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or an aryl group which may have a substituent, and R^{76} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (24)



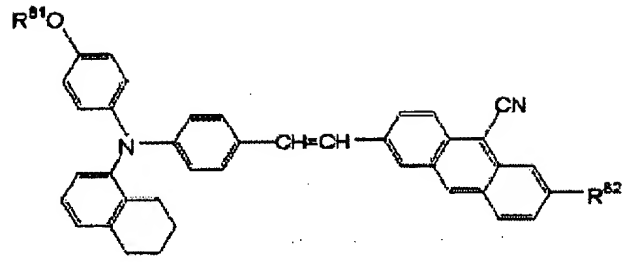
(where, in the general formula (24) above, R^{77} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{78} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (25)



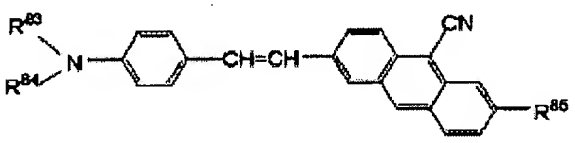
(where, in the general formula (25) above, R^{79} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{80} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (26)



(where, in the general formula (26) above, R^{81} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{82} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

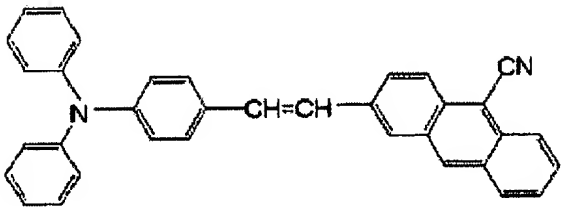
General formula (27)



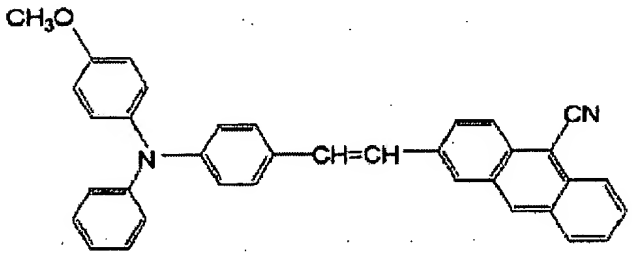
(where, in the general formula (27) above, R^{83} and R^{84} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{85} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

9. An aminostyrylanthracene compound as defined in Claim 6, which is represented by the following structural formula (28)-1, (28)-2, (28)-3, (28)-4, (28)-5, (28)-6, (28)-7, (28)-8, (28)-9, (28)-10, (28)-11, or (28)-12.

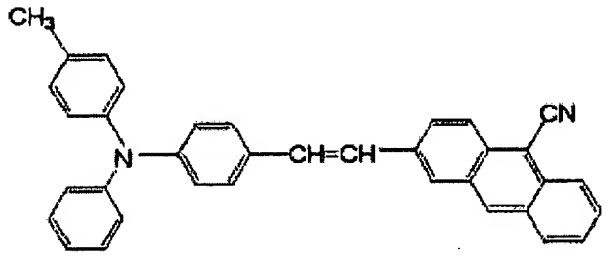
Structural formula (28)-1



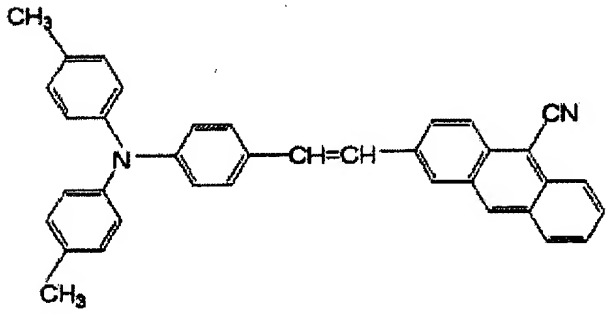
Structural formula (28)-2



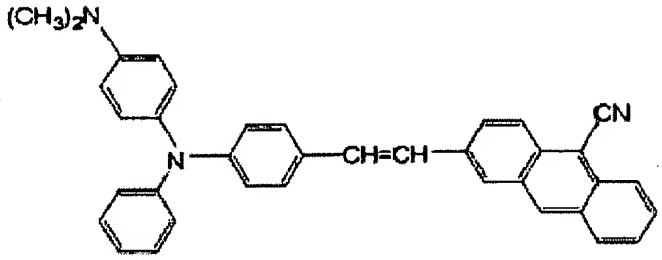
Structural formula (28)-3



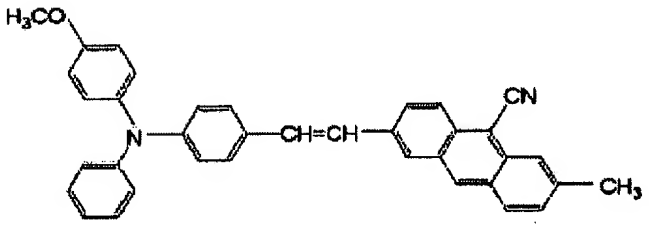
Structural formula (28)-4



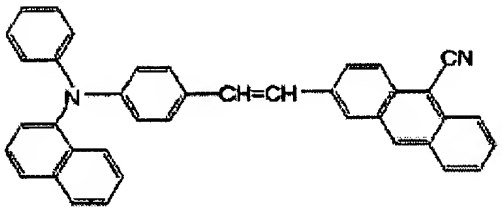
Structural formula (28)-5



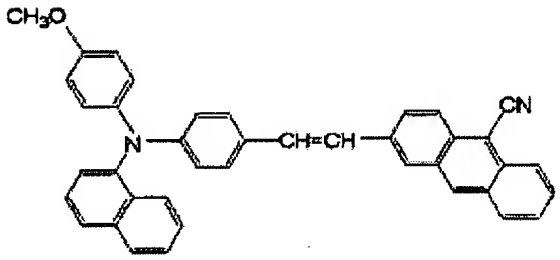
Structural formula (28)-6



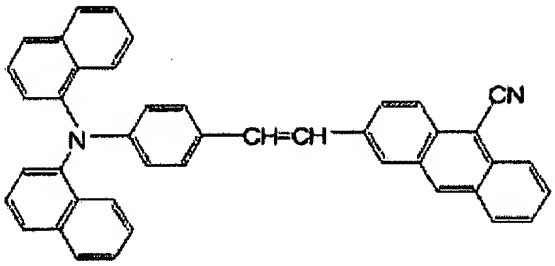
Structural formula (28)-7



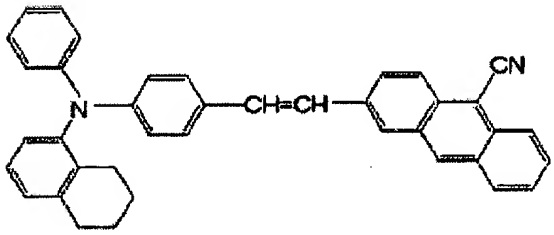
Structural formula (28)-8



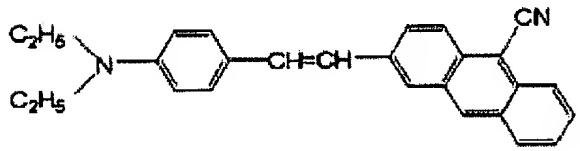
Structural formula (28)-9



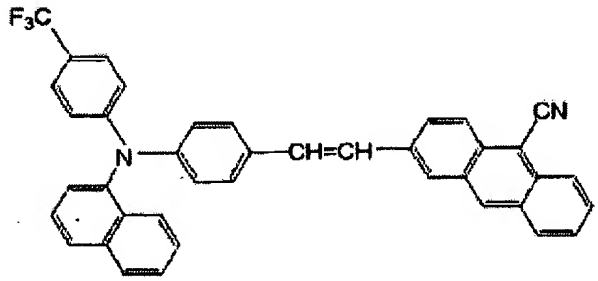
Structural formula (28)-10



Structural formula (28)-11

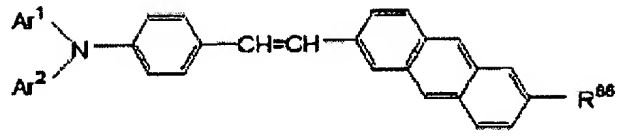


Structural formula (28)-12



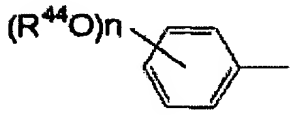
10. An aminostyrylanthracene compound as defined in Claim 1, which is represented by the following general formula (29).

General formula (29)

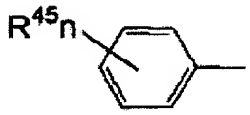


(where, in the general formula (29) above, Ar^1 and Ar^2 are identical or different aryl groups which may have a substituent and, if they have a substituent, they represent a group selected from aryl groups represented by the following general formulas (6), (7), (8), (9), (10), and (11),

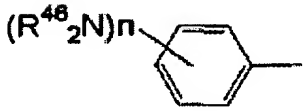
General formula (6)



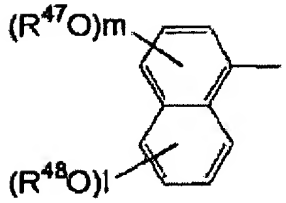
General formula (7)



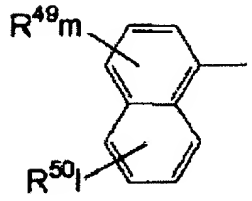
General formula (8)



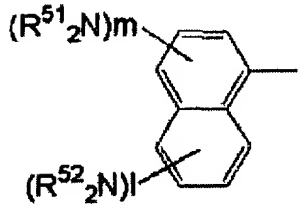
General formula (9)



General formula (10)



General formula (11)



(where, in the general formulas (6), (7), (8), (9), (10), and (11) above, R^{44}, R^{45}, and R^{46} each represent a saturated or unsaturated hydrocarbon group having one or more carbons or a fluoroalkyl group, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} are identical or different groups, each representing a saturated or unsaturated hydrocarbon group having one or more carbons, or a fluoroalkyl group, n is an integer of 0 to 5, m is an integer of 0 to 3, and l is an integer of 0 to 3),

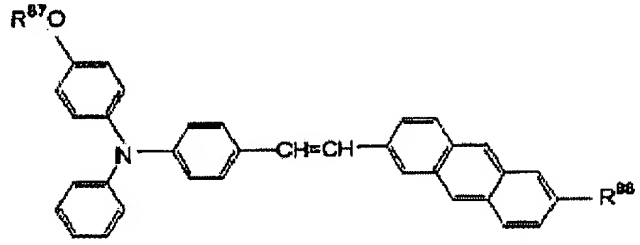
R^{86} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent.]

11. An aminostyrylanthracene compound as defined in Claim 10, in which R^{44}, R^{45}, R^{46}, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} each represent a group having 1 to 6 carbons.

12. An aminostyrylanthracene compound as defined in Claim 10, which is

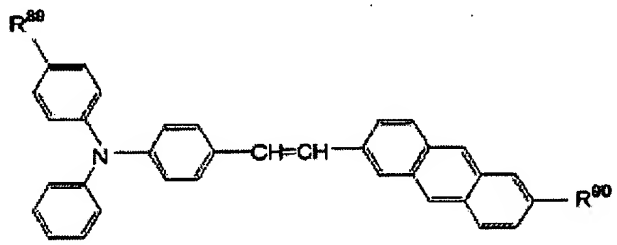
represented by the following general formula (30), (31), (32), (33), (34), (35), or (36).

General formula (30)



(where, in the general formula (30) above, R^{87} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{88} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

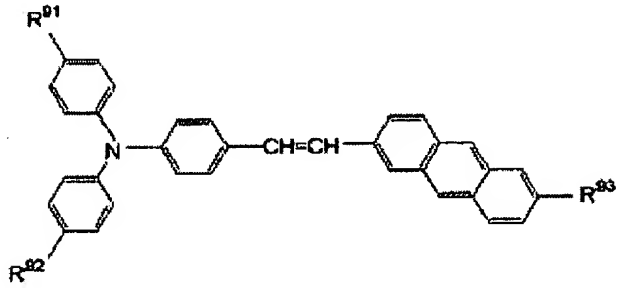
General formula (31)



(where, in the general formula (31) above, R^{89} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or an aryl group which may have a substituent, and R^{90} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may

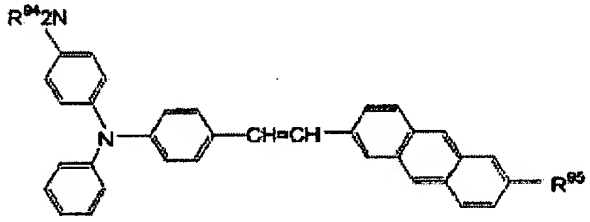
have a substituent.)

General formula (32)



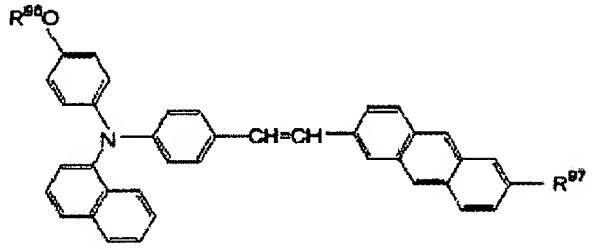
(where, in the general formula (32) above, R^{91} and R^{92} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or an aryl group which may have a substituent, and R^{93} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (33)



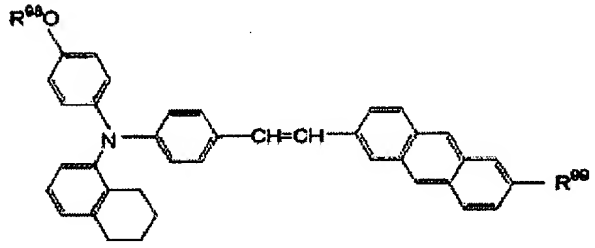
(where, in the general formula (33) above, R^{94} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{95} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (34)



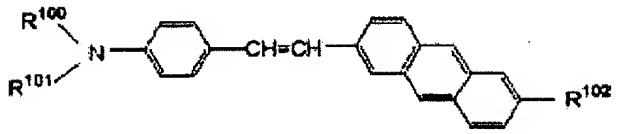
(where, in the general formula (34) above, R^{96} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{97} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (35)



(where, in the general formula (35) above, R^{98} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{99} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

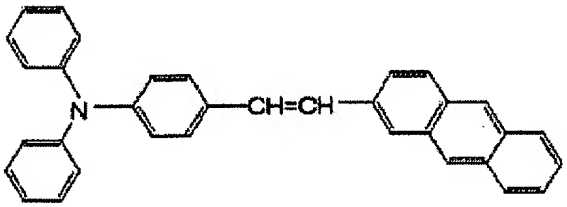
General formula (36)



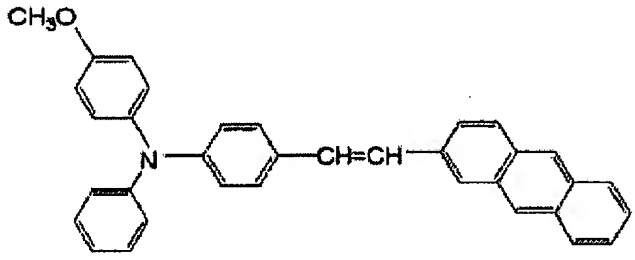
(where, in the general formula (36) above, R^{100} and R^{101} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{102} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

13. An aminostyrylanthracene compound as defined in Claim 10, which is represented by the following structural formula (37)-1, (37)-2, (37)-3, (37)-4, (37)-5, (37)-6, (37)-7, (37)-8, (37)-9, (37)-10, (37)-11, or (37)-12.

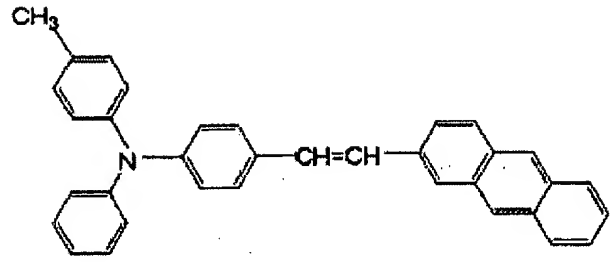
Structural formula (37)-1



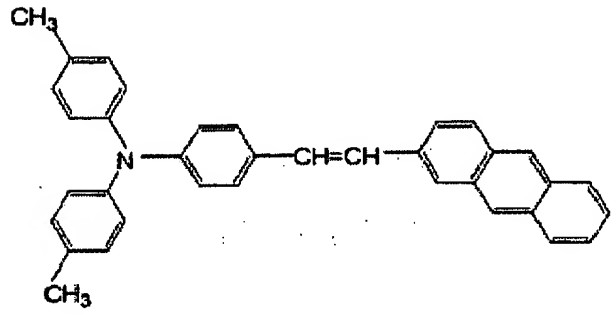
Structural formula (37)-2



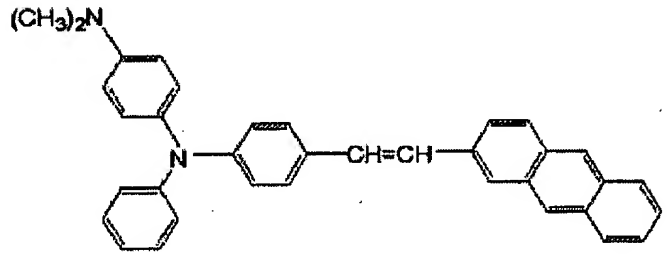
Structural formula (37)-3



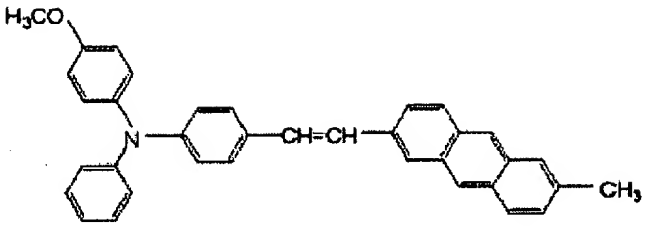
Structural formula (37)-4



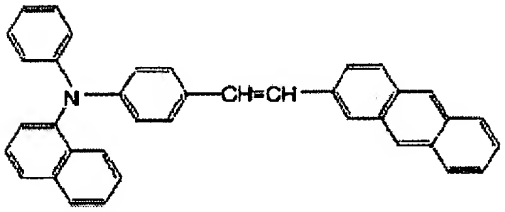
Structural formula (37)-5



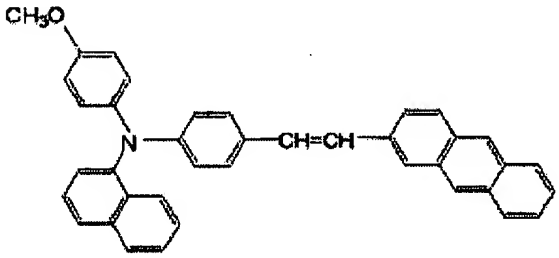
Structural formula (37)-6



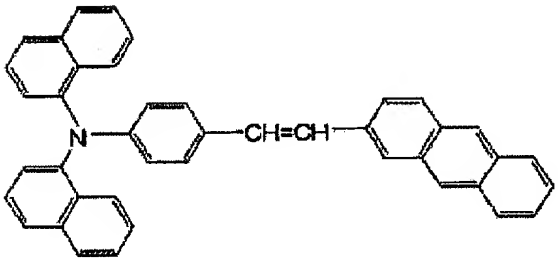
Structural formula (37)-7



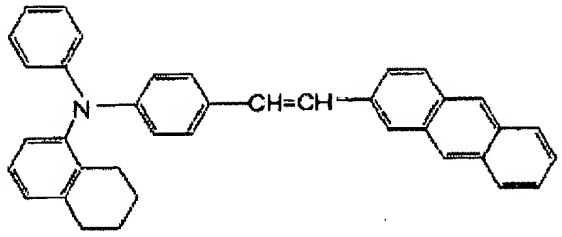
Structural formula (37)-8



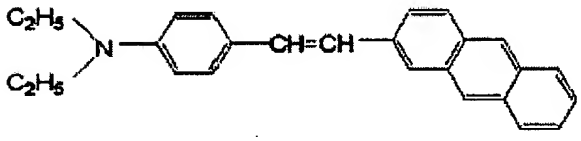
Structural formula (37)-9



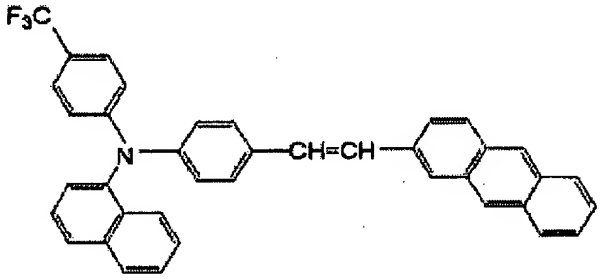
Structural formula (37)-10



Structural formula (37)-11

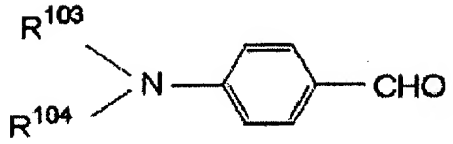


Structural formula (37)-12



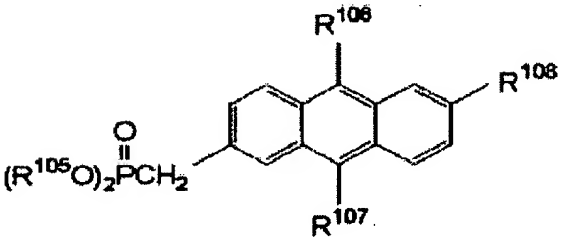
14. A process for producing an aminostyrylanthracene compound which comprises condensing an aminobenzaldehyde represented by the following general formula [V] with a phosphonic ester represented by the following general formula [VI] or a phosphonium salt represented by the following general formula [VII], thereby giving an aminostyrylanthracene compound represented by the following general formula [I], [II], [III], or [IV].

General formula [V]

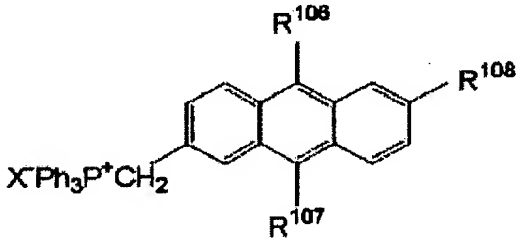


(where, in the general formula [V] above, R^{103} and R^{104} each represent the group corresponding to the following R^1, R^2, R^{11}, R^{12}, R^{21}, R^{22}, R^{38}, or R^{39})

General formula [VI]

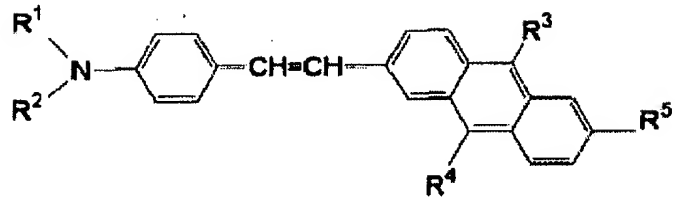


General formula [VII]



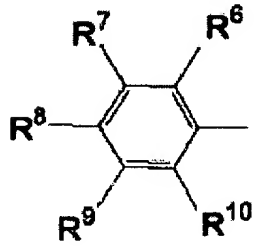
(where, in the general formulas [VI] and [VII] above, R^{105} represents a hydrocarbon group, R^{106} and R^{107} each represent the group corresponding to the following R^3, R^4, R^{13}, R^{14}, R^{23}, R^{24}, R^{40}, or R^{41}, R^{108} represents the group corresponding to the following R^5, R^{16}, R^{25}, or R^{42}, and X represents a halogen atom)

General formula [I]



[where, in the general formula [I] above, R^2 represents an unsubstituted aryl group, R^1 represents an aryl group represented by the following general formula (1),

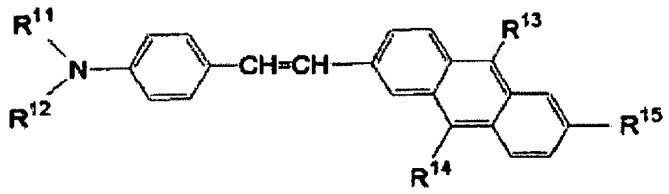
General formula (1)



(where, in the general formula (1) above, R^6, R^7, R^8, R^9, and R^{10} are identical or different groups, each representing a hydrogen atom, a saturated or unsaturated hydrocarbon oxy group having one or more carbons, a hydrocarbon group, a hydrocarbon amino group, a fluoroalkyl group, or an aryl group which may have a substituent),

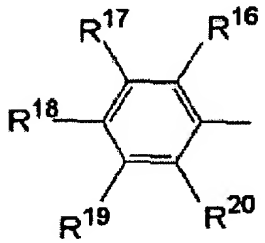
R^3 and R^4 are identical or different groups, at least one of them being a hydrogen atom, a cyano group, a fluoroalkyl group, a nitro group, or a halogen atom, and R^5 represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent.]

General formula [II]



[where, in the general formula [II] above, R^{11} and R^{12} are identical or different groups, each representing an aryl group represented by the following general formula (2),

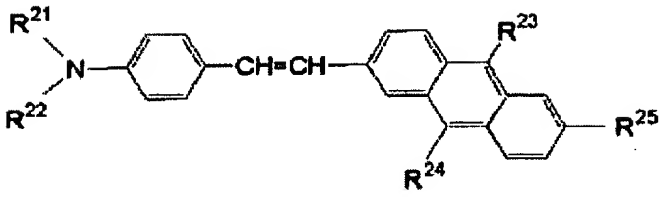
General formula (2)



(where, in the general formula (2) above, R^{16}, R^{17}, R^{18}, R^{19}, and R^{20} are identical or different groups, each representing a hydrogen atom, a saturated or unsaturated hydrocarbon oxy group having one or more carbons, a hydrocarbon group, a hydrocarbon amino group, a fluoroalkyl group, or an aryl group which may have a substituent),

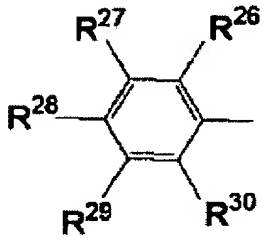
R^{13} and R^{14} are identical or different groups, at least one of them being a hydrogen atom, a cyano group, a fluoroalkyl group, a nitro group, or a halogen atom, and R^{15} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent.]

General formula [III]



[where, in the general formula [III] above, R^{21} represents an aryl group represented by the following general formula (3),

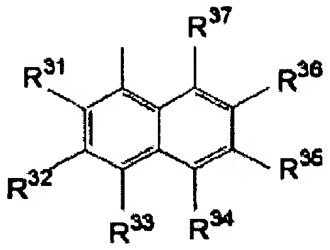
General formula (3)



(where, in the general formula (3) above, R^{26}, R^{27}, R^{28}, R^{29}, and R^{30} are identical or different groups, each representing a hydrogen atom, a saturated or unsaturated hydrocarbon oxy group having one or more carbons, a hydrocarbon group, a hydrocarbon amino group, or a fluoroalkyl group),

R^{22} represents an aryl group represented by the following general formula (4)

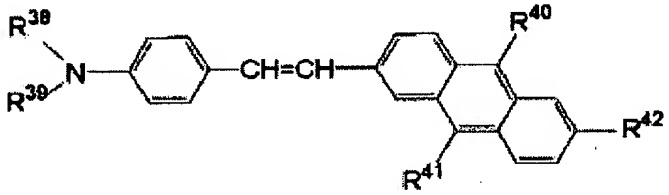
General formula (4)



(where, in the general formula (4) above, R^{31}, R^{32}, R^{33}, R^{34}, R^{35}, R^{36}, and R^{37} are identical or different groups, each representing a hydrogen atom, a saturated or unsaturated hydrocarbon oxy group having one or more carbons, a hydrocarbon group, a hydrocarbon amino group, a fluoroalkyl group, or an aryl group which may have a substituent),

R^{23} and R^{24} are identical or different groups, at least one of them being a hydrogen atom, a cyano group, a fluoroalkyl group, a nitro group, or a halogen atom, and R^{25} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent.]

General formula [IV]



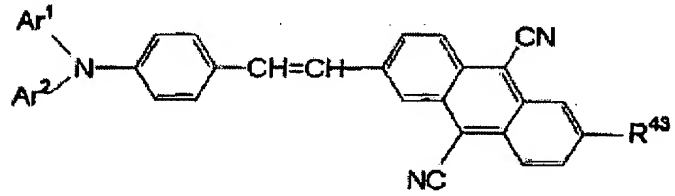
[where, in the general formula [IV] above, R^{38} and R^{39} are identical or different groups, at least one of them being a hydrogen atom or a saturated or unsaturated hydrocarbon group having one or more carbons, R^{40} and R^{41} are identical or different groups, at least of them being a hydrogen atom, a cyano group, a

fluoroalkyl group, a nitro group, or a halogen atom, and R^{42} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent.]

15. A process for producing the aminostyrylanthracene compound defined in Claim 14, wherein said process comprises performing said condensation by Wittig-Horner reaction or Wittig reaction, treating said phosphonic ester and/or said phosphonium salt with a base in a solvent, thereby giving carboanions, and condensing these carboanions with said aminobenzaldehyde.

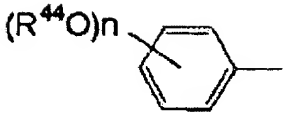
16. A process for producing an aminostyrylanthracene compound as defined in Claim 14, wherein an aminostyrylanthracene compound represented by the following general formula (5)

General formula (5)

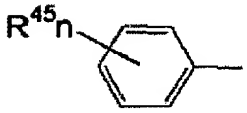


[where, in the general formula (5) above, Ar^1 and Ar^2 are identical or different aryl groups which may have a substituent and, if they have a substituent, they represent a group selected from aryl groups represented by the following general formulas (6), (7), (8), (9), (10), and (11),

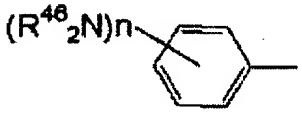
General formula (6)



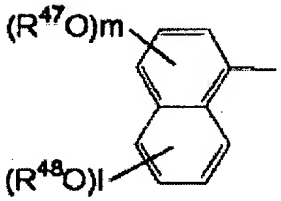
General formula (7)



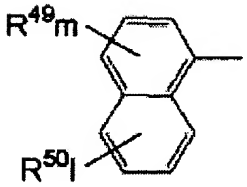
General formula (8)



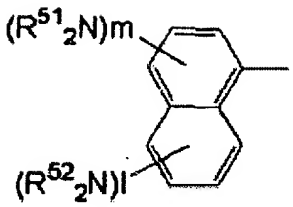
General formula (9)



General formula (10)



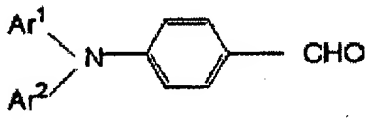
General formula (11)



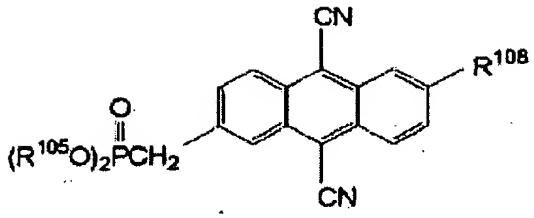
(where, in the general formulas (6), (7), (8), (9), (10), and (11) above, R^{44}, R^{45}, and R^{46} each represent a saturated or unsaturated hydrocarbon group having one or more carbons, or a fluoroalkyl group, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} are identical or different groups, each representing a saturated or unsaturated hydrocarbon group having one or more carbons, or a fluoroalkyl group, n is an integer of 0 to 5, m is an integer of 0 to 3, and l is an integer of 0 to 3), R^{43} is a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent]

is obtained by condensing 4-(N,N-diarylamino)benzaldehyde represented by the following general formula (38) with a phosphonic ester represented by the following general formula (39) or a phosphonium salt represented by the following general formula (40).

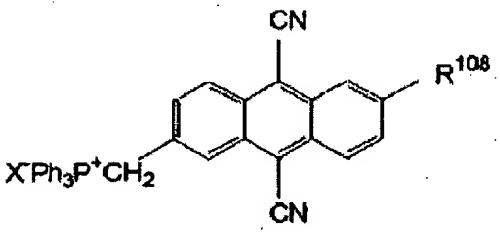
General formula (38)



General formula (39)



General formula (40)



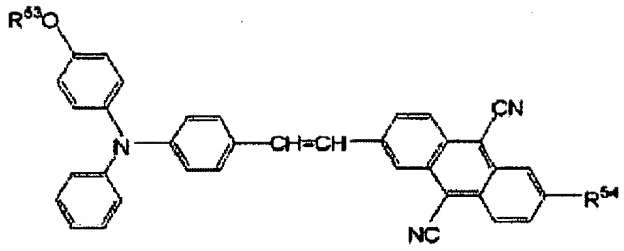
(where, in the general formulas (38), (39), and (40) above, Ar^1, Ar^2, R^{105}, and X are defined as above.)

17. A process for producing an aminostyrylanthracene compound as defined in Claim 14, wherein said R^{105} is a saturated hydrocarbon group having 1 to 4 carbons.

18. A process for producing an aminostyrylanthracene compound as defined in Claim 16, wherein R^{44}, R^{45}, R^{46}, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} are groups having 1 to 6 carbons.

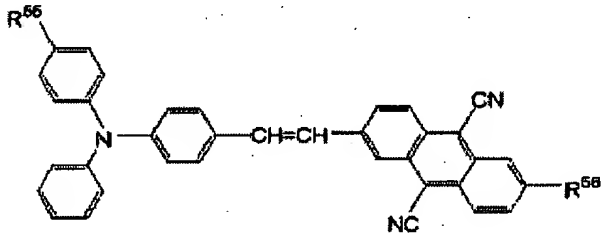
19. A process for producing an aminostyrylanthracene compound as defined in Claim 16, wherein said process gives an aminostyrylanthracene compound represented by the following general formula (12), (13), (14), (15), (16), (17), or (18).

General formula (12)



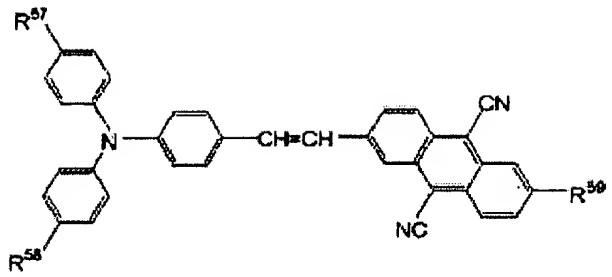
(where, in the general formula (12) above, R^{53} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{54} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (13)



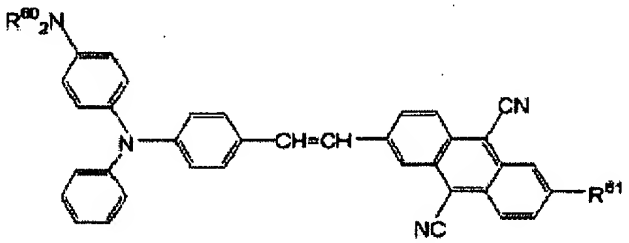
(where, in the general formula (13) above, R^{55} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or an aryl group which may have a substituent, and R^{56} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (14)



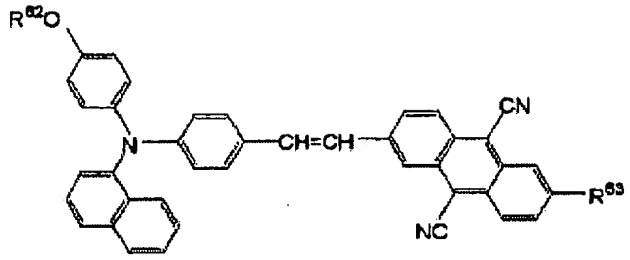
(where, in the general formula (14) above, R^{57} and R^{58} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or an aryl group which may have a substituent, and R^{59} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent)

General formula (15)



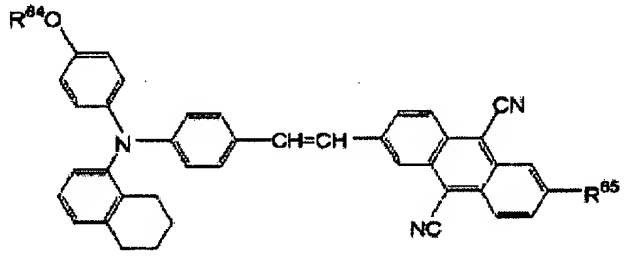
(where, in the general formula (15) above, R^{60} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{61} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent)

General formula (16)



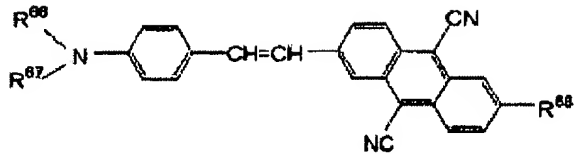
(where, in the general formula (16) above, R^{62} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{63} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent)

General formula (17)



(where, in the general formula (17) above, R^{64} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{65} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent)

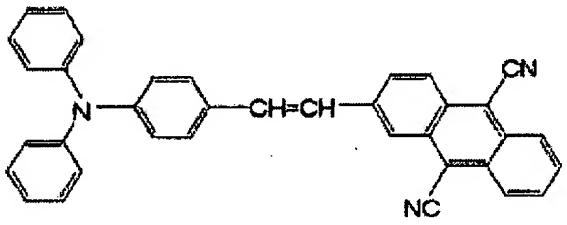
General formula (18)



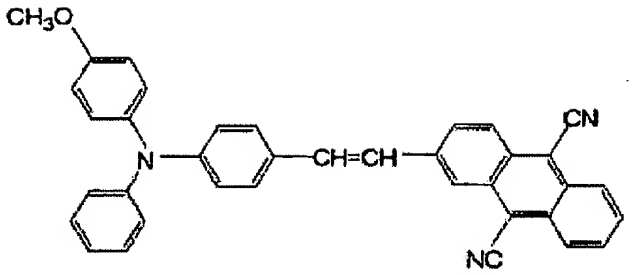
(where, in the general formula (18) above, R^{66} and R^{67} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{68} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

20. A process for producing an aminostyrylanthracene compound as defined in Claim 16, wherein said process gives an aminostyrylanthracene compound represented by the following structural formula (19)-1, (19)-2, (19)-3, (19)-4, (19)-5, (19)-6, (19)-7, (19)-8, (19)-9, (19)-10, (19)-11, or (19)-12.

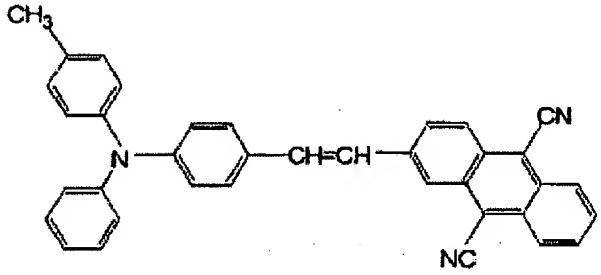
Structural formula (19)-1



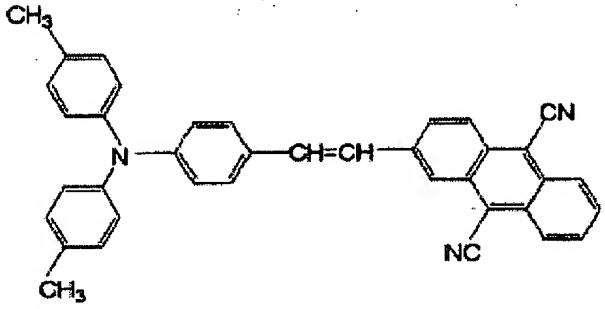
Structural formula (19)-2



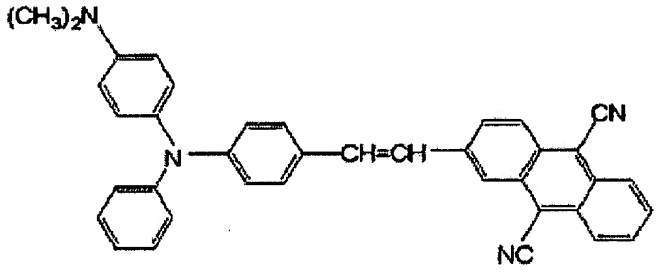
Structural formula (19)-3



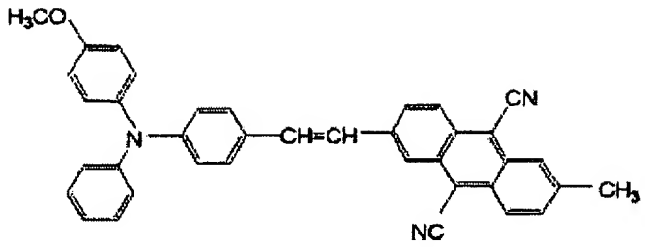
Structural formula (19)-4



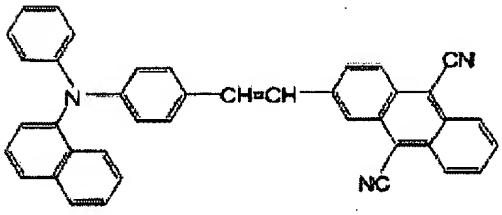
Structural formula (19)-5



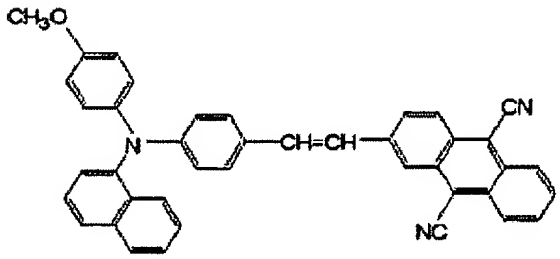
Structural formula (19)-6



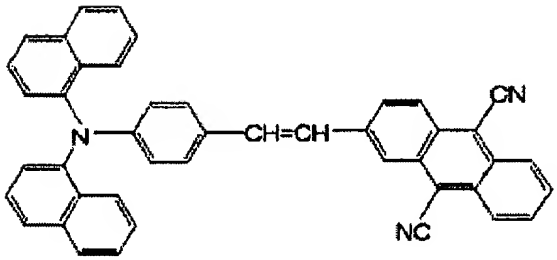
Structural formula (19)-7



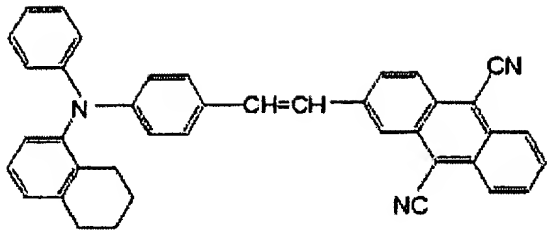
Structural formula (19)-8



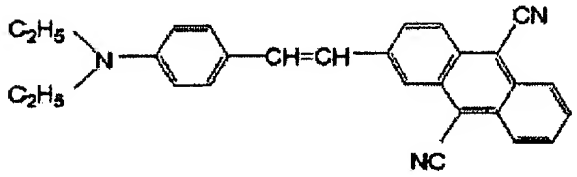
Structural formula (19)-9



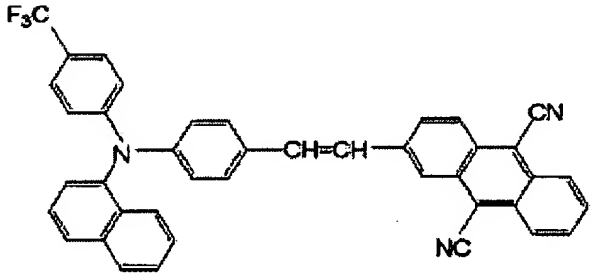
Structural formula (19)-10



Structural formula (19)-11

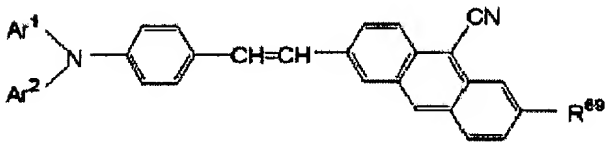


Structural formula (19)-12



21. A process for producing an aminostyrylanthracene compound as defined in Claim 14, wherein an aminostyrylanthracene compound represented by the following general formula (20)

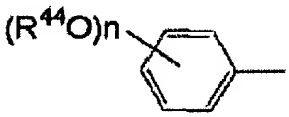
General formula (20)



[where, in the general formula (20) above, Ar^1 and Ar^2 are identical or different

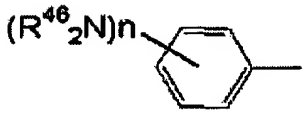
aryl groups which may have a substituent and, if they have a substituent, they represent a group selected from aryl groups represented by the following general formulas (6), (7), (8), (9), (10), and (11),

General formula (6)

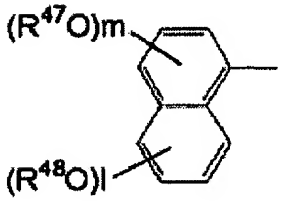


General formula (7)

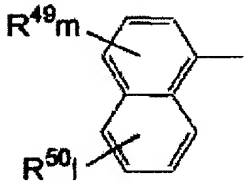
General formula (8)



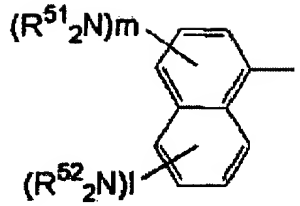
General formula (9)



General formula (10)



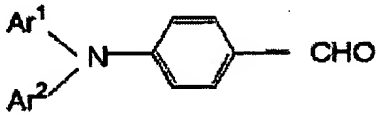
General formula (11)



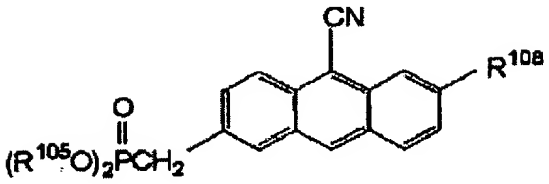
(where, in the general formulas (6), (7), (8), (9), (10), and (11) above, R^{44}, R^{45}, and R^{46} each represent a saturated or unsaturated hydrocarbon group or a fluoroalkyl group, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} are identical or different groups, each representing a saturated or unsaturated hydrocarbon group having one or more carbons, or a fluoroalkyl group, n is an integer of 0 to 5, m is an integer of 0 to 3, and l is an integer of 0 to 3), R^{69} is a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent]

is obtained by condensing 4-(N,N-diarylamino)benzaldehyde represented by the following general formula (38) with a phosphonic ester represented by the following general formula (41) or a phosphonium salt represented by the following general formula (42).

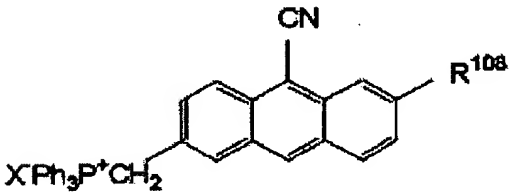
General formula (38)



General formula (41)



General formula (42)

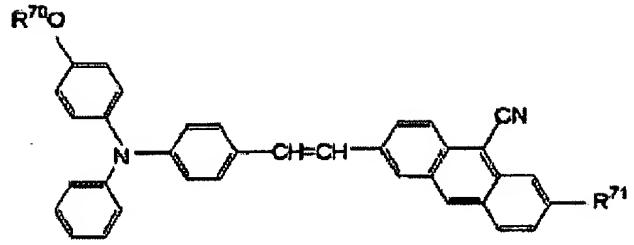


(where, in the general formulas (38), (41), and (42) above, Ar^1, Ar^2, R^{105}, and X are defined as above.)

22. A process for producing an aminostyrylanthracene compound as defined in Claim 21, wherein R^{44}, R^{45}, R^{46}, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} are groups having 1 to 6 carbons.

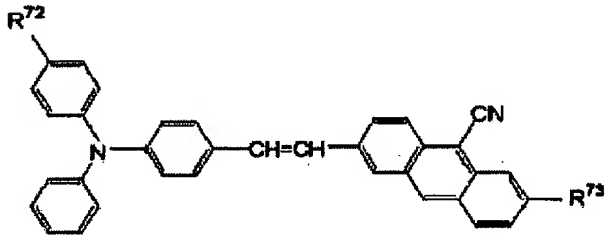
23. A process for producing an aminostyrylanthracene compound as defined in Claim 21, wherein said process gives an aminostyrylanthracene compound represented by the following general formula (21), (22), (23), (24), (25), (26), or (27).

General formula (21)



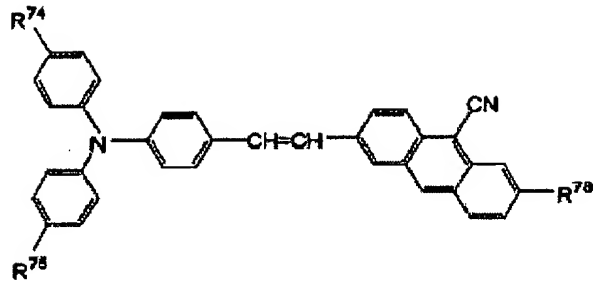
(where, in the general formula (21) above, R^{70} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{71} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (22)



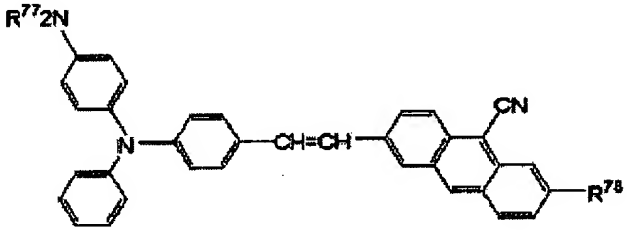
(where, in the general formula (22) above, R^{72} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or an aryl group which may have a substituent, and R^{73} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (23)



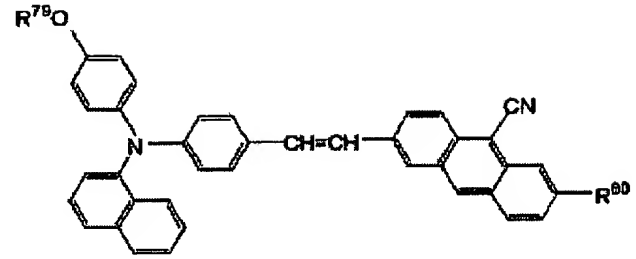
(where, in the general formula (23) above, R^{74} and R^{75} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or an aryl group which may have a substituent, and R^{76} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (24)



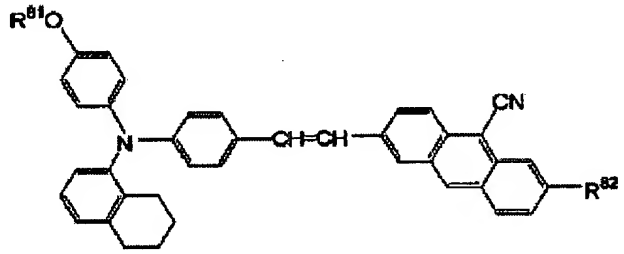
(where, in the general formula (24) above, R^{77} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{78} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (25)



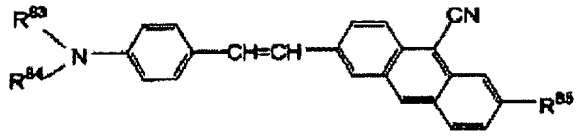
(where, in the general formula (25) above, R^{79} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{80} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (26)



(where, in the general formula (26) above, R^{81} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{82} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

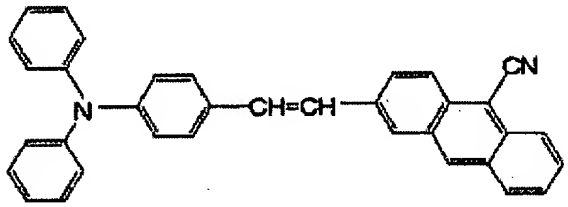
General formula (27)



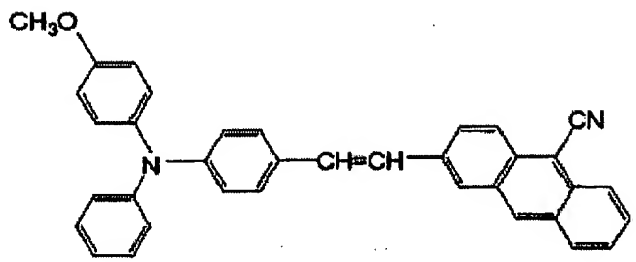
(where, in the general formula (27) above, R^{83} and R^{84} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{85} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

24. A process for producing an aminostyrylanthracene compound as defined in Claim 21, wherein said process gives an aminostyrylanthracene compound represented by the following structural formula (28)-1, (28)-2, (28)-3, (28)-4, (28)-5, (28)-6, (28)-7, (28)-8, (28)-9, (28)-10, (28)-11, or (28)-12.

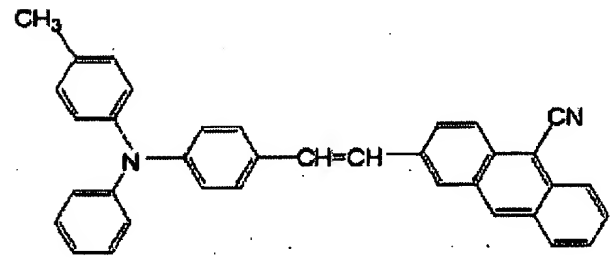
Structural formula (28)-1



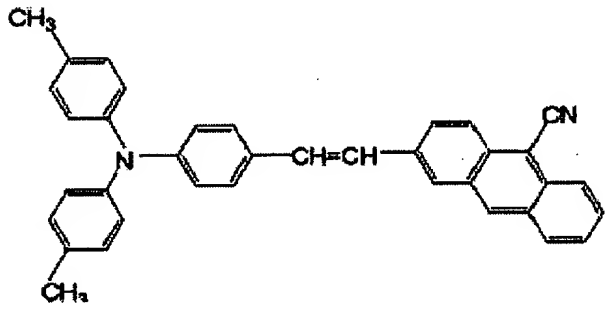
Structural formula (28)-2



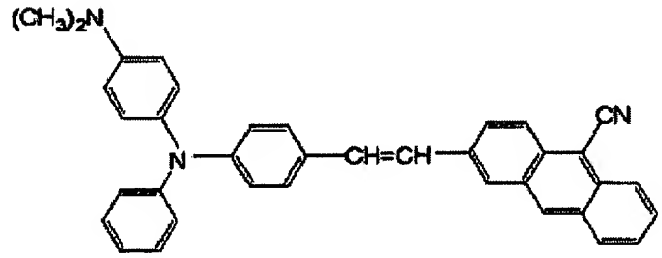
Structural formula (28)-3



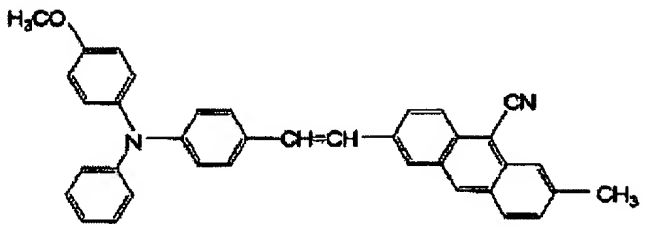
Structural formula (28)-4



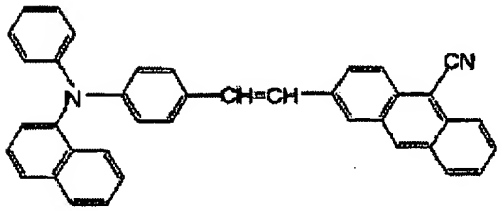
Structural formula (28)-5



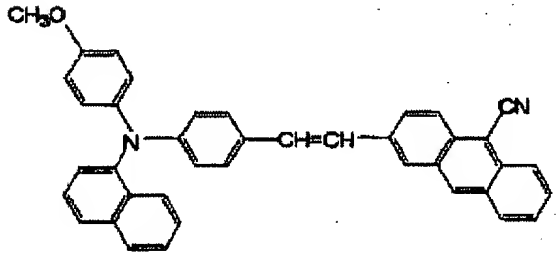
Structural formula (28)-6



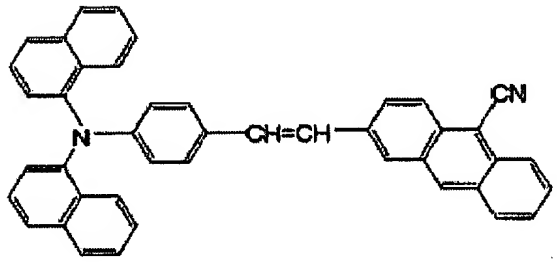
Structural formula (28)-7



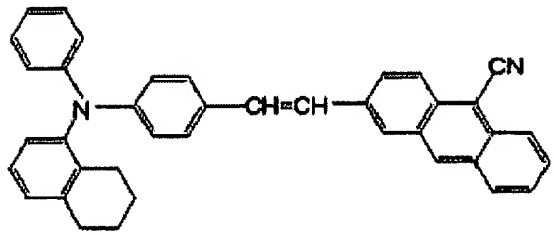
Structural formula (28)-8



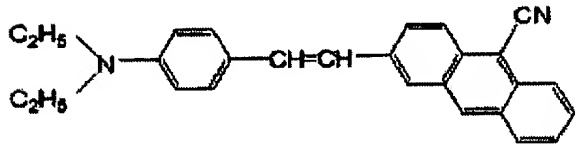
Structural formula (28)-9



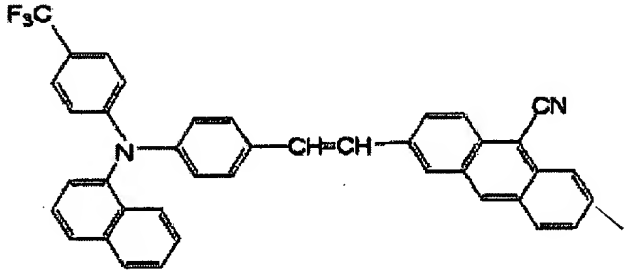
Structural formula (28)-10



Structural formula (28)-11

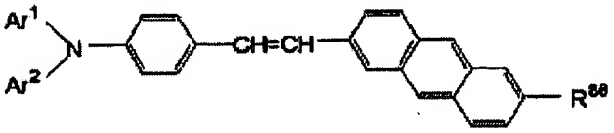


Structural formula (28)-12



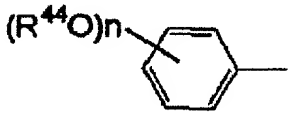
25. A process for producing an aminostyrylanthracene compound as defined in Claim 14, wherein an aminostyrylanthracene compound represented by the following general formula (29)

General formula (29)



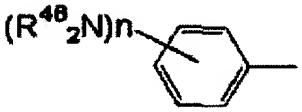
[where, in the general formula (29) above, Ar^1 and Ar^2 are identical or different aryl groups which may have a substituent and, if they have a substituent, they represent a group selected from aryl groups represented by the following general formulas (6), (7), (8), (9), (10), and (11),

General formula (6)

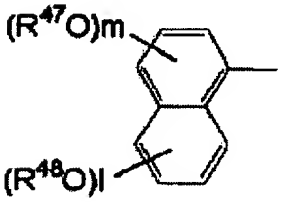


General formula (7)

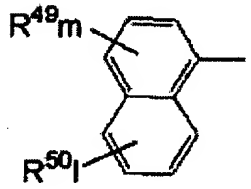
General formula (8)



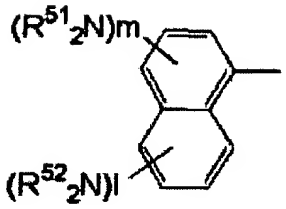
General formula (9)



General formula (10)



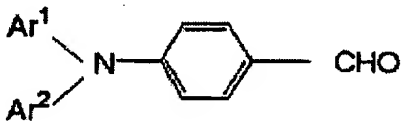
General formula (11)



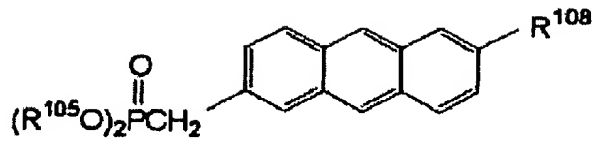
(where, in the general formulas (6), (7), (8), (9), (10), and (11) above, R^{44}, R^{45}, and R^{46} each represent a saturated or unsaturated hydrocarbon group or a fluoroalkyl group, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} are identical or different groups, each representing a saturated or unsaturated hydrocarbon group having one or more carbons, or a fluoroalkyl group, n is an integer of 0 to 5, m is an integer of 0 to 3, and l is an integer of 0 to 3), R^{86} is a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent]

is obtained by condensing 4-(N,N-diarylamino)benzaldehyde represented by the following general formula (38) with a phosphonic ester represented by the following general formula (43) or a phosphonium salt represented by the following general formula (44).

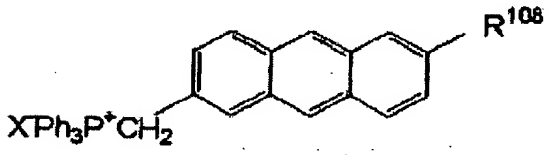
General formula (38)



General formula (43)



General formula (44)

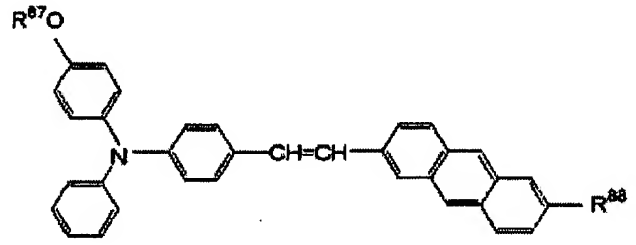


(where, in the general formulas (38), (43), and (44) above, Ar^1, Ar^2, R^{105}, and X are defined as above.)

26. A process for producing an aminostyrylanthracene compound as defined in Claim 25, wherein R^{44}, R^{45}, R^{46}, R^{47}, R^{48}, R^{49}, R^{50}, R^{51}, and R^{52} are groups having 1 to 6 carbons.

27. A process for producing an aminostyrylanthracene compound as defined in Claim 25, wherein said process gives an aminostyrylanthracene compound represented by the following general formula (30), (31), (32), (33), (34), (35), or (36).

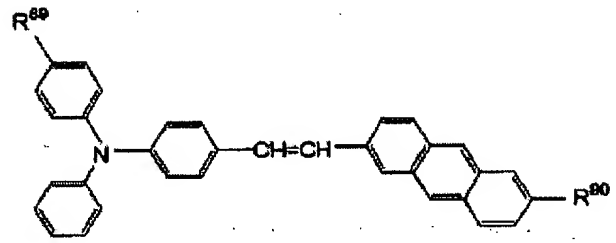
General formula (30)



(where, in the general formula (30) above, R^{87} represents a saturated or unsaturated

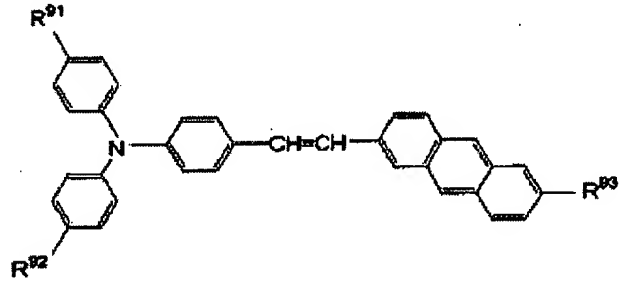
hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{88} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (31)



(where, in the general formula (31) above, R^{89} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or an aryl group which may have a substituent, and R^{90} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

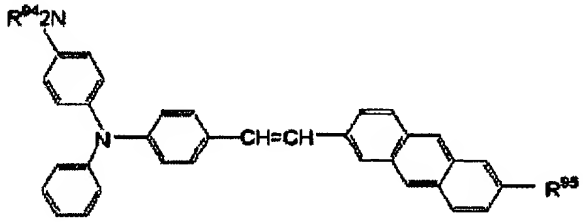
General formula (32)



(where, in the general formula (32) above, R^{91} and R^{92} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, a trifluoromethyl group, or

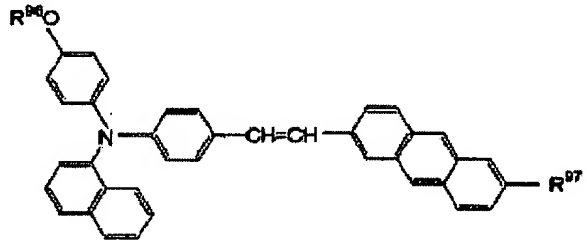
an aryl group which may have a substituent, and R^{93} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent)

General formula (33)



(where, in the general formula (33) above, R^{94} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{95} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent)

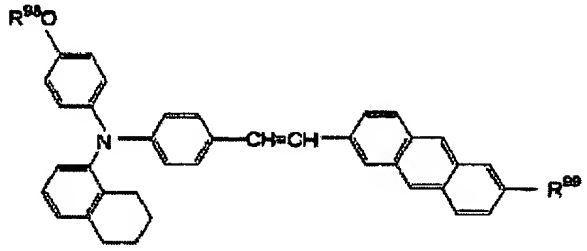
General formula (34)



(where, in the general formula (34) above, R^{96} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{97} represents a hydrogen atom, a saturated or unsaturated

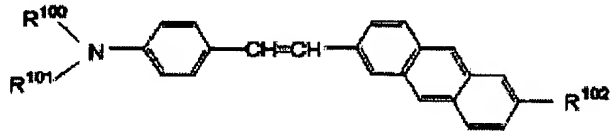
hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (35)



(where, in the general formula (35) above, R^{98} represents a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{99} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.)

General formula (36)

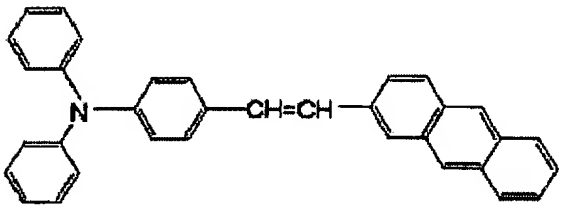


(where, in the general formula (36) above, R^{100} and R^{101} each represent a saturated or unsaturated hydrocarbon group having 1 to 6 carbons or an aryl group which may have a substituent, and R^{102} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having 1 to 6 carbons, or an aryl group which may have a substituent.) .

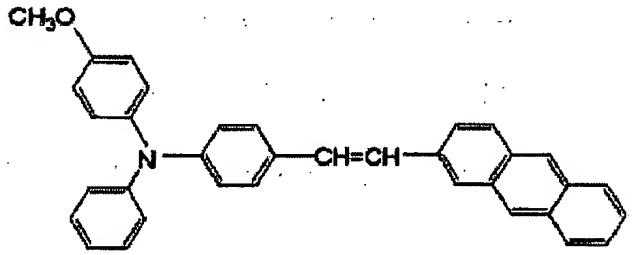
28. A process for producing an aminostyrylanthracene compound as defined in

Claim 25, wherein said process gives an aminostyrylanthracene compound represented by the following structural formula (37)-1, (37)-2, (37)-3, (37)-4, (37)-5, (37)-6, (37)-7, (37)-8, (37)-9, (37)-10, (37)-11, or (37)-12.

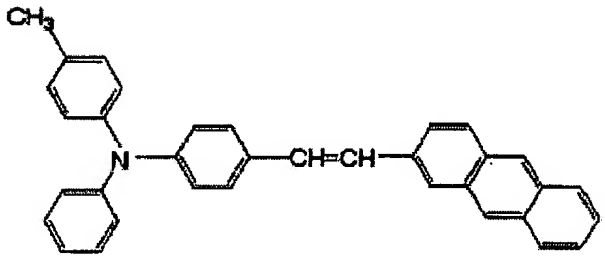
Structural formula (37)-1



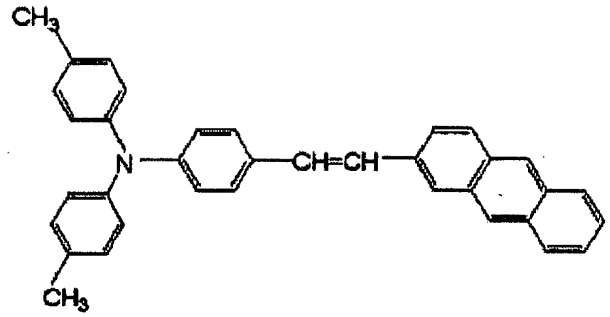
Structural formula (37)-2



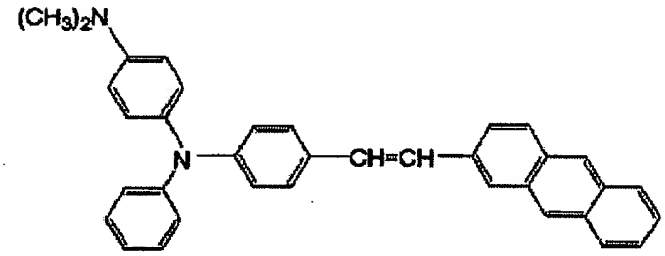
Structural formula (37)-3



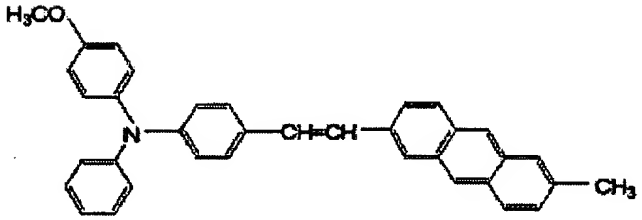
Structural formula (37)-4



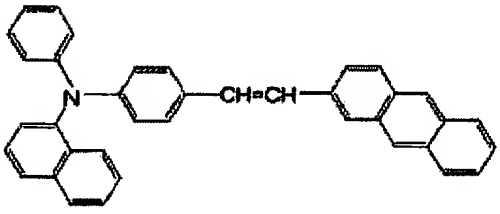
Structural formula (37)-5



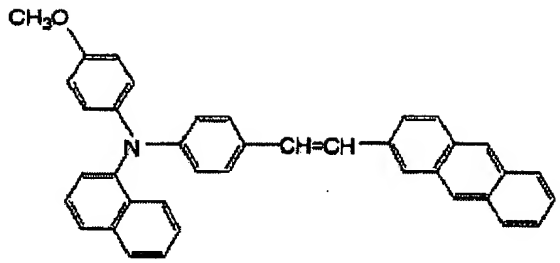
Structural formula (37)-6



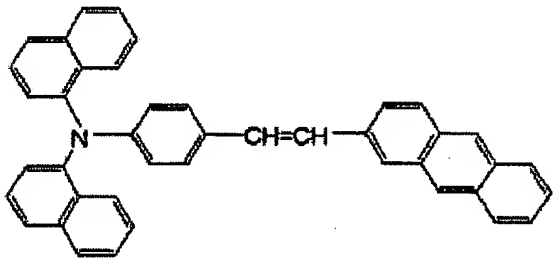
Structural formula (37)-7



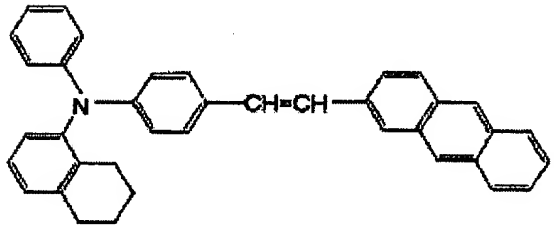
Structural formula (37)-8



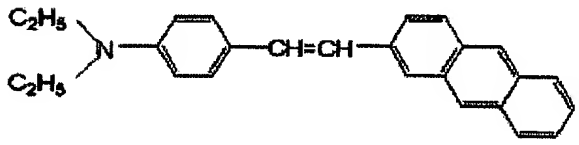
Structural formula (37)-9



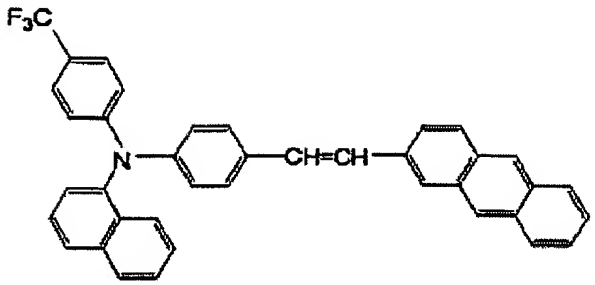
Structural formula (37)-10



Structural formula (37)-11

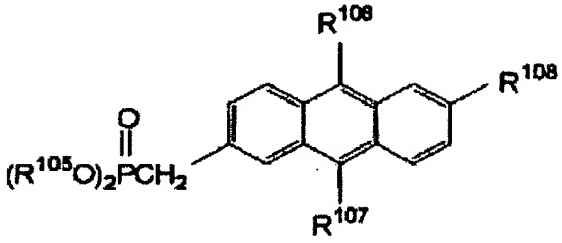


Structural formula (37)-12

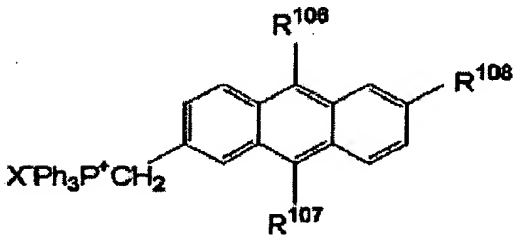


29. A phosphonic ester or phosphonium salt represented by the following general formula [VI] or [VII].

General formula [VI]



General formula [VII]



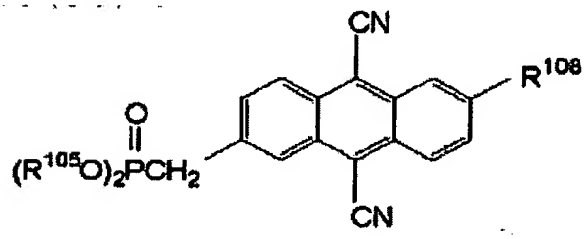
(where, in the general formulas [VI] and [VII] above, R^{105} represents a hydrocarbon group, R^{106} and R^{107} are identical or different groups, at least one of them representing a hydrogen atom, cyano group, fluoroalkyl group, nitro group, or halogen atom, R^{108} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have

a substituent, and X represents a halogen atom.)

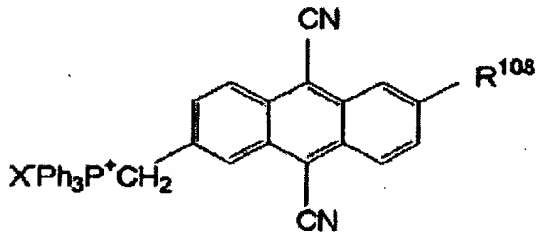
30. A phosphonic ester or phosphonium salt as defined in Claim 29, wherein R^{105} represents a saturated hydrocarbon group having 1 to 4 carbons.

31. A phosphonic ester or phosphonium salt as defined in Claim 29, which is represented by the following general formula (39) or (40).

General formula (39)

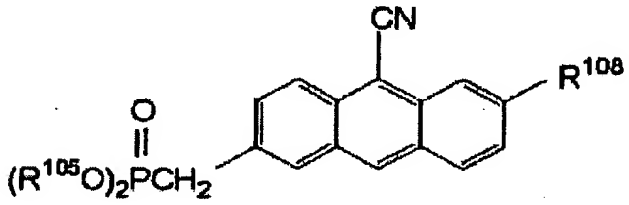


General formula (40)

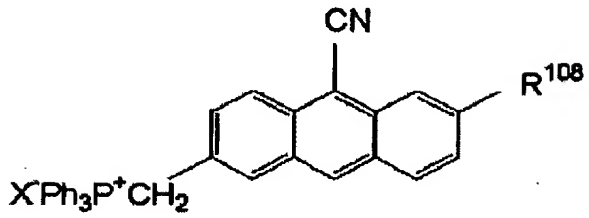


32. A phosphonic ester or phosphonium salt as defined in Claim 29, which is represented by the following general formula (41) or (42).

General formula (41)

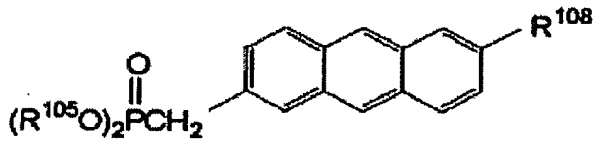


General formula (42)

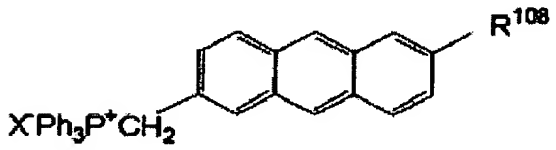


33. A phosphonic ester or phosphonium salt as defined in Claim 29, which is represented by the following general formula (43) or (44).

General formula (43)

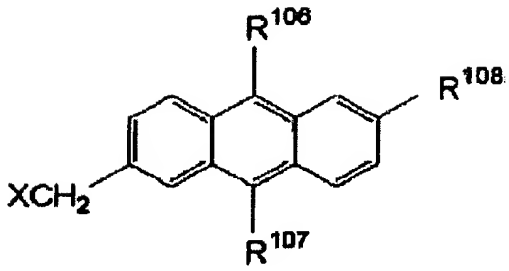


General formula (44)



34. A process for producing a phosphonic ester or phosphonium salt, which comprises reacting a halogenated aryl compound represented by the following general formula [VIII] with a trialkyl phosphite represented by the following general formula [IX] or triphenylphosphine (PPh_3), thereby giving a phosphonic ester or phosphonium salt represented by the following general formula [VI] or [VII].

General formula [VIII]



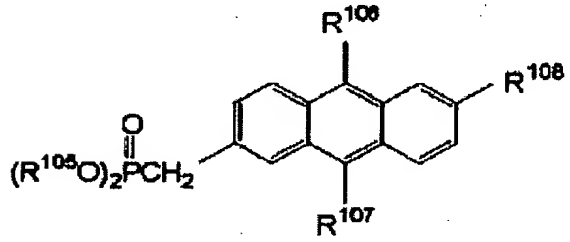
(where, in the general formula [VIII] above, R^{106} and R^{107} are identical or different groups, at least one of them representing a hydrogen atom, cyano group, fluoroalkyl group, nitro group, or halogen atom, R^{108} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent, and X represents a halogen atom.)

General formula [IX]

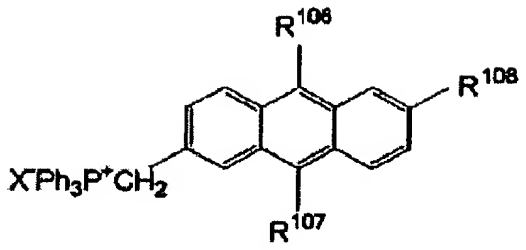
$$P(OR^{105})_3$$

(where, in the general formula [IX] above, R^{105} represents a hydrocarbon group.)

General formula [VI]



General formula [VII]

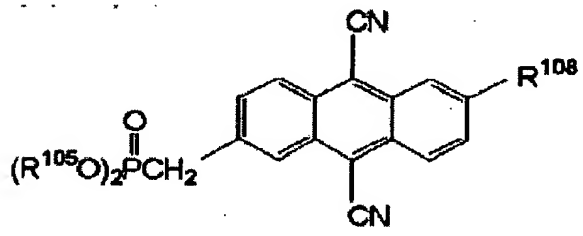


(where, in the general formulas [VI] and [VII] above, R^{105}, R^{106}, R^{107}, R^{108}, and X are defined as above.)

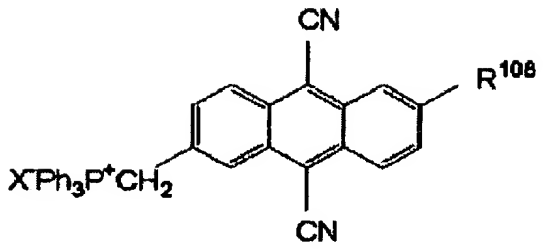
35. A process for producing phosphonic ester or phosphonium salt as defined in Claim 34, wherein R^{105} represents a saturated hydrocarbon group having 1 to 4 carbons.

36. A process for producing a phosphonic ester or phosphonium salt as defined in Claim 34, which gives a phosphonic ester or phosphonium salt represented by the following general formula (39) or (40).

General formula (39)

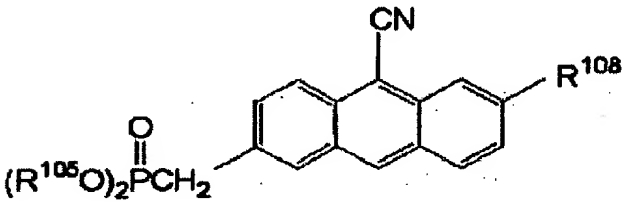


General formula (40)

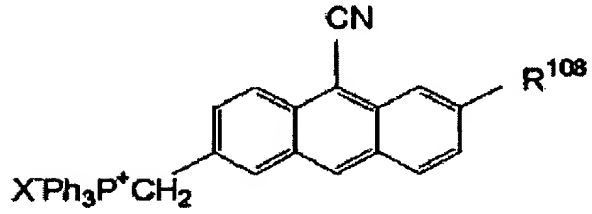


37. A process for producing a phosphonic ester or phosphonium salt as defined in Claim 34, which gives a phosphonic ester or phosphonium salt represented by the following general formula (41) or (42).

General formula (41)

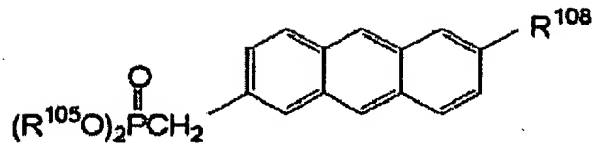


General formula (42)

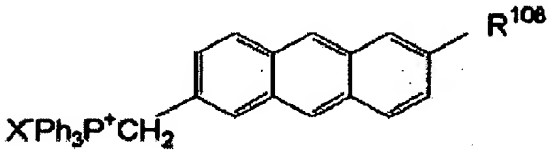


38. A process for producing a phosphonic ester or phosphonium salt as defined in Claim 34, which gives a phosphonic ester or phosphonium salt represented by the following general formula (43) or (44).

General formula (43)

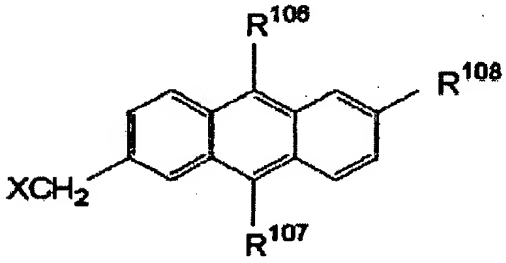


General formula (44)



39. An halogenated aryl compound represented by the following general formula [VIII].

General formula [VIII]

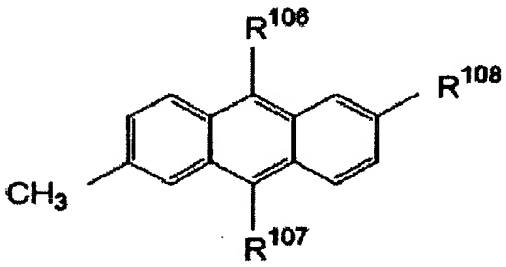


(where, in the general formula [VIII] above, R^{106} and R^{107} are identical or different groups, at least one of them representing a hydrogen atom, cyano group, fluoroalkyl group, nitro group, or halogen atom, R^{108} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent, and X represents a halogen atom.)

40. A process for producing a halogenated aryl compound which comprises reacting an anthracene compound represented by the following general formula [X] with an N-halogenated succinimide represented by the following general formula

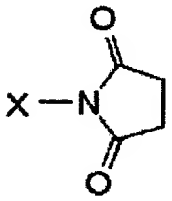
[XI], thereby giving a halogenated aryl compound represented by the following general formula [VIII].

General formula [X]



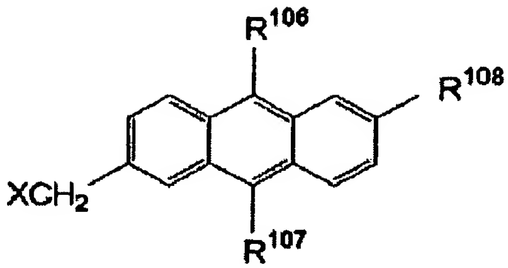
(where, in the general formula [X] above, R^{106} and R^{107} are identical or different groups, at least one of them representing a hydrogen atom, cyano group, fluoroalkyl group, nitro group, or halogen atom, R^{108} represents a hydrogen atom, a saturated or unsaturated hydrocarbon group having one or more carbons, or an aryl group which may have a substituent.)

General formula [XI]



(where, in the general formula [XI] above, X represents a halogen atom.)

General formula [VIII]



(where, in the general formula [VIII] above, R^{106}, R^{107}, R^{108}, and X are defined as above.)